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Original Article

A Comparative Study on Spinal Anesthesia versus General Anesthesia for Laparoscopic Cholecystectomy

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ABSTRACT

Introduction: *The choice between spinal anesthesia and general anesthesia for laparoscopic cholecystectomy can influence patient outcomes, recovery times, post-operative pain management and complication rates. Evaluating these anesthesia techniques is essential for optimizing patient care and surgical efficiency. This study aimed to compare the effectiveness and safety of spinal versus general anesthesia in laparoscopic cholecystectomy.* ***Methods & Materials:*** *This comparative study was conducted at the Department of Anesthesiology, Sheikh Hasina Medical College Hospital, Jamalpur and 250 Beded General Hospital, Jamalpur Bangladesh from January 2024 to May 2024. In the study, 120 patients classified under the American Society of Anesthesiologists (ASA) Grades I or II were randomly divided into two groups for laparoscopic cholecystectomy. Group A (60 patients) received general anesthesia, while Group B (60 patients) received spinal anesthesia. Data was analyzed using SPSS version 26.0.* ***Results:*** *Demographic data showed that over half of both groups were under 30 years, with females predominating at 55.0% in Group A and 56.7% in Group B. Group A had a significantly longer anesthesia duration compared to Group B (p<0.001) and notably longer pneumoperitoneum time (p=0.013). Visual Analog Scale (VAS) scores were consistently higher for Group A at all time points, all statistically significant with p-values under 0.0001. Group A also experienced more postoperative events than Group B.* ***Conclusion:*** *General anesthesia is traditionally preferred for more complex procedures due to better airway control. However, spinal anesthesia demonstrates some advantages over general anesthesia for laparoscopic cholecystectomy, particularly in terms of better post-operative pain management and less side effects.*

Keywords: *Comparative study, General anesthesia, Laparoscopic cholecystectomy, Nausea, Spinal anesthesia, Vomiting*

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INTRODUCTION

Laparoscopic cholecystectomy is considered the gold standard for treating symptomatic gallstones disease and other gallbladder pathologies [1]. Its minimally invasive procedure typically leads to reduced postoperative pain, shorter hospital stays, and faster recovery times when compared to open surgery [2]. Anesthesia is indeed a key factor in determining patient outcomes during laparoscopic cholecystectomy. The choice between spinal anesthesia (SAB) and general anesthesia (GA) is of considerable clinical interest [3]. Traditionally, general anesthesia has been favored for laparoscopic procedures, as it offers controlled unconsciousness, muscle relaxation, and efficient management of airway and respiratory parameters during surgery [4]. Despite being the traditional choice, general anesthesia (GA) can lead to potential complications such as postoperative nausea and vomiting (PONV), respiratory issues, and longer recovery periods, which has led to the exploration of alternatives [5]. Spinal anesthesia (SAB), which involves injecting anesthetic drug into the subarachnoid space, is garnering interest for its potential advantages in laparoscopic procedures [6]. It allows patients to remain conscious while providing pain relief and muscle relaxation, potentially reducing GA-related complications and enhancing recovery [7]. Spinal anesthesia can indeed provide benefits like stable hemodynamics, reduced risk of postoperative nausea and vomiting (PONV), and decreased postoperative pain, enhancing patient satisfaction [8]. However, its application in laparoscopic cholecystectomy is debated due to concerns like intraoperative patient discomfort, restlessness, shoulder pain from pneumoperitoneum, and potential issues with surgical field exposure [9]. To understand the effectiveness, safety, and influence on surgical outcomes, a comprehensive comparison of spinal anesthesia (SAB) and general anesthesia (GA) is essential [10]. Our comparative study aimed to evaluate the efficacy and safety of spinal anesthesia against general

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anesthesia in laparoscopic cholecystectomy patients. It focused on critical factors like intraoperative and postoperative complications, recovery time, and patient satisfaction to offer evidence-based recommendations for anesthesia selection [11]. These insights are vital for improving patient care and boosting the success rates of laparoscopic cholecystectomies.

METHODS & MATERIALS

This comparative study was conducted at the Department Anesthesiology, Sheikh Hasina Medical College Hospital, Jamalpur and 250 Beded General Hospital, Jamalpur Bangladesh from January 2024 to May 2024. In our study, we randomly assigned 120 patients classified as ASA physical Grades I or II, aged 18-60 years, into two groups for laparoscopic cholecystectomy with standard pressure pneumoperitoneum. Group A consisted of 60 patients who received general anesthesia, while Group B comprised 60 patients who received spinal anesthesia, both using standardized techniques. Each patient underwent a standard four-port laparoscopic cholecystectomy. For this study, the exclusion criteria disqualified patients with acute inflammatory processes such as cholecystitis, pancreatitis, or cholangitis, as well as those with suspected or confirmed common bile duct stones. Patients prone to anxiety, with bleeding diathesis, local spinal deformities, a history of previous open upper abdominal surgery, and those with cardiovascular disorders, respiratory disorders, renal and liver diseases, circulatory instability, BMI>30 or known sensitivity to local anesthetics, were also excluded. The collected data were analyzed using MS Office and SPSS version 26.0. p-value of <0.05 was considered as the indicator of statistical significance.

RESULT

The demographic data showed that slightly over half of the participants in both Groups A (51.7%) and B (53.3%) were under 30 years. Those aged 31-45 made up 38.3% of Group A and 35.0% of Group B, while participants over 45 comprised 10.0% of Group A and 11.7% of Group B. Females predominated in both groups, with 55.0% in Group A and 56.7% in Group B. The study found that the mean anesthesia duration was significantly longer for Group A at 50.5 minutes compared to Group B at 45.1 minutes, with a p-value of less than 0.001. The surgery time showed no significant difference, with Group A averaging 45.5 minutes and Group B 43.6 minutes (p-value = 0.258). However, the pneumoperitoneum duration was significantly longer in Group A at 40.4 minutes versus 38.1 minutes in Group B, with a p-value of 0.013. The Visual Analog Scale (VAS) scores, which measure pain intensity, show that Group A had consistently higher scores at all measured time points compared to Group B. At 0 hours, Group A scored 3.6, significantly higher than the 2.7 scored by Group B. This trend continued at 4, 8, 12, and 24 hours, with Group A's scores consistently higher than those of Group B (3.5 vs 2.3, 3.3 vs 1.6, 2.8 vs 1.3, and 2.2 vs 1.1, respectively). All differences were statistically significant with p-values less than 0.0001. This suggests that Group A experienced more pain postoperatively compared to Group B. In the postoperative phase, Group A experienced more events compared to Group B. Specifically, pain abdomen was reported in 3 cases, nausea-vomiting in 5 cases, and sore throat in 5 cases, all within Group A. Group B, on the other hand, had no reports of these symptoms but did have three cases of urinary retention and two cases of back pain.

Table – I: Demographic data

Characteristics	Group A (n=60)		Group B (n=60)	
	n (%)			
Age distribution (Year)				
<30	31	51.7%	32	53.3%
31-45	23	38.3%	21	35.0%
>45	6	10.0%	7	11.7%
Gender distribution				
Male	27	45.0%	26	43.3%
Female	33	55.0%	34	56.7%

Table – II: Mean anesthesia and surgery time (Minute)

Duration	Group A (n=60)	Group B (n=60)	p-value
Anesthesia	50.5 ±6.9	45.1 ± 6.3	<0.001
Surgery	45.5 ± 5.4	43.6± 5.2	0.258
PP	40.4 ±5.2	38.1 ±4.8	0.013

PP=Pneumoperitoneum

Table – III: Visual Analog Scale score distribution

Hours	Group A	Group B	p-value
0	3.6 ±0.7	2.7 ±0.8	<0.0001
4	3.5 ±0.8	2.3 ±0.8	<0.0001
8	3.3 ±0.9	1.6 ±0.8	<0.0001
12	2.8 ±0.6	1.3 ±0.6	<0.0001
24	2.2 ±0.5	1.1 ±0.4	<0.0001

Table – IV: Post-operative events

Event	Group A	Group B
Pain abdomen	3	0
Nausea-vomiting	5	0
Urinary retention	0	3
Back Pain	0	2
Sore throat	5	0

DISCUSSION

In this study, the demographic data indicated that slightly over half of the participants in each group were under 30 years of age. Additionally, females were the majority in both groups, accounting for 55.0% in Group A and 56.7% in Group B. A comparative demographic distribution was observed in another study of India [1]. Our study findings suggest that the mean anesthesia duration was significantly longer for Group A compared to Group B, with a highly significant p-value of less

than 0.001. While the overall surgery time did not differ significantly between the two groups, the pneumoperitoneum duration was significantly longer in Group A, with a p-value of 0.013. Nearly similar results were found in another study [13]. In our study, the Visual Analog Scale (VAS) scores indicated that Group A experienced more postoperative pain compared to Group B at all time points measured. At 0 hours, Group A scored 3.6, while Group B scored 2.7. This pattern persisted at 4, 8, 12, and 24 hours, with Group A's scores of 3.5, 3.3, 2.8, and 2.2 consistently exceeding Group B's scores of 2.3, 1.6, 1.3, and 1.1, respectively. All the differences were statistically significant with p-values less than 0.0001. These findings were supported by another study [14]. In this study, in the postoperative phase, Group A experienced more complications compared to Group B. Specifically, Group A reported 3 cases of abdominal pain, 5 cases of nausea and vomiting, and 5 cases of sore throat. In contrast, Group B did not report these symptoms but did have three case of urinary retention and two cases of back pain. Hans et al. also found nearly similar results [13]. The ancient study highlighted that spinal anesthesia provided hemodynamic stability similar to general anesthesia, with the added benefit of a reduced neuroendocrine stress response [15]. Recently, the trend has shifted towards using regional anesthesia in laparoscopic surgeries, especially among geriatric and high-risk patients, due to its advantages, including increased patient satisfaction [16].

Limitation of the study:

Our study was single-centered with a small sample size and conducted over a short duration. Consequently, the findings may not fully capture or represent the broader national scenario.

CONCLUSION & RECOMMENDATION

General Anesthesia remains the preferred choice for complex procedures due to its superior airway control. However, spinal anesthesia shows notable benefits for laparoscopic cholecystectomy, providing improved pain management and fewer side effects. We recommend considering spinal anesthesia as an alternative in suitable patients to enhance postoperative outcomes. Further studies are needed to evaluate patient response and tailor anesthesia techniques to individual needs, ensuring both safety and comfort during and after surgery. Exploring this option could lead to more favorable patient experiences.

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